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The Foundry Trades' Equipment and Supplies Association

When we founded the Foundry Trades' Equipment and Supplies Association some 21 years ago, those who were associated with us had little more in mind than the establishment of a national exhibition policy. At this time such an action was essential because promoters were in the position to announce the holding of an exhibition without prior consultation with the obvious exhibitors. Since its foundation, the Association has exercised full control in this direction, often co-operating with the Institute of British Foundrymen in order that international congresses should be made additionally attractive. Thus exhibitions were held in 1926, 1929, 1933 and 1935. A fifth was arranged to take place at Olympia in September, 1939, but was obviously cancelled.

Early in the war, under the presidency of Mr. G. E. France, an export group was formed as a separate body, but with a good deal of liaison. About this time the Ministry of Food utilised the Association to operate the control of Dextrin—a material largely used by the foundries in connection with core making. Last year, the Association, under its present chairman, Mr. D. Cherry Paterson, underwent a thorough reorganisation in order to align its activities with current affairs. Thus it is at the moment devoting its attention to the orderly disposal of foundry plant and machinery no longer required by the various Government-owned and controlled factories. If its efforts are successful, it means that used machinery offered to the foundry industry will have been thoroughly overhauled and reconditioned by the makers. This obviously implies proper servicing and a continuous interest in the behaviour and performance by the designers, and is a commendable procedure. Again, the Association, with Government co-operation, is sending a delegation to Germany to report on any developments of a worthwhile character which have been made there during the last six years, plus, of course, a statement of what equipment and materials were used in the German foundry industry. Finally, the Association is prepared, and, indeed, anxious, to meet organised sections of the foundry industry to discuss common problems of design and suitability of plant. Indeed, one such arrangement has already been made.

The spirit which animates the Association is one of service to the industry for which it caters, both at home and abroad. In this latter connection a handbook is now being produced for distribution amongst overseas buyers. The Association is no longer modest. Inquiries asking for the supply of colourable imitations of German plant will be probably told that a group of firms which so successfully tooled up Great Britain's foundry industry for its production of tanks and aeroplanes is well capable of meeting any demand from resources built up on its own designs and experience. Under its present council, there is every reason to believe that the Association will be of real and increasing service to the foundry industry during and after its conversion to peacetime production.

CRUSHERS FOR THE FAR EAST

Stone crushers manufactured in South Africa have played an important part in the rebuilding of the Burma Road. The Army requires crushed aggregates primarily for concrete fortifications, gun emplacements, aerodrome runways and road construction, and for several years crusher manufacture to produce these aggregates has been an important department of South African war production.

Some time before the war the manufacture of crushers had already been established in South Africa by two firms, W. S. Thomas & Company (Pty.), Limited, and Samuel Osborn (S.A.), Limited, who are the main contractors for the orders placed by the South-East Asia Command through the Director-General of Supplies, Johannesburg.

Contents

The Foundry Trades' Equipment and Supplies Association, 67.—A New Spray Booth, 68.—Forthcoming Events, 68.—High Tensile Steel for Castings, 69.—South African Foundrymen Elect New Officers, 77.—Power Requirements in Alloy Steel Rolling, 79.—Comments on a Pattern, 80.—Expansion Programme of South African Firms, 80.—Imports and Exports of Iron and Steel in 1945, 81.—Disposal of Surplus Machine Tools, 81.—Notes from the Branches, 82.—Earnings of Manual Workers, 82.—Obituary, 82.—Tentative Recommended Methods for Casting Cast-Iron Test-Bars, 84.—French Foundry Delegation Here, 84.—News in Brief, 86.—Steel Federation's Independent Chairman, 86.—August Iron and Steel Output, 86.—Raw Material Markets, 88.

A NEW SPRAY BOOTH

Spencer & Halstead, Limited, of Ossett, have designed a spray booth of particularly pleasing appearance, as will be seen from Fig. 1. When it was decided to design this apparatus, it was thought best to incorporate an efficient dust collector and exhaust fan built as one unit. At the same time, an effort was made to ensure that the appearance of the unit conformed to modern ideas. Older types have suffered from the existence of sharp corners and the inevitable forest of branch and main exhaust piping and sometimes inferior illumination. The inclusion of a central fan was not invariably successful.

The booth shown in Fig. 1 is 4 ft. 6 in. wide between the scroll side cheeks and 6 ft. high to the top of the working aperture. It is 3 ft. 6 in. from the face of the working aperture to the louvres of the back wall itself. The sill can be removed by a lift and pull motion permitting of the removal of the floor tray. The runners on which the floor tray rests can also be taken out, leaving the booth quite clear for cleaning out.

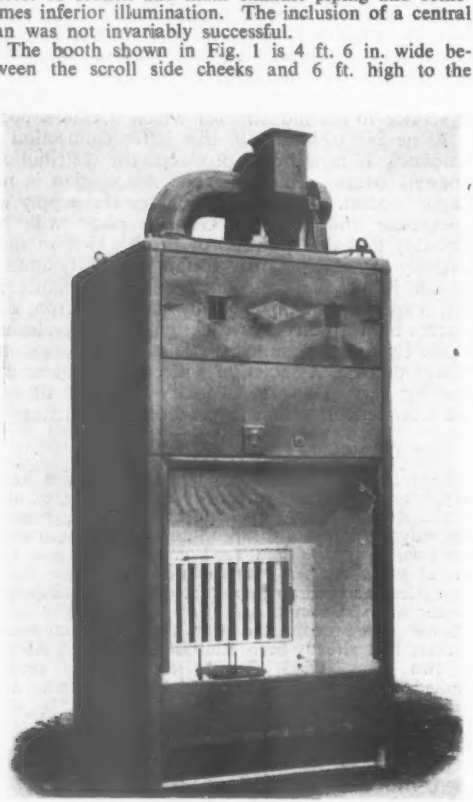

FIG. 1.—A NEW TYPE OF SPRAY BOOTH.

The door of the dust compartment is fitted with a rubber gasket, which is held in position by spring clips. When the louvres are closed, they completely seal off the dust compartment. The screens in the dust arrester, which is mounted above the working space, are shaken by means of a handle—shown in the right-hand top corner of the illustration. The closing of the louvres prevents the escape of dust during the cleaning operation, which should be carried out whilst the fan is stopped to ensure that all the dust is shaken from the filter screens. When the door of the filter screen chamber is removed, it gives access to the inverted "V"-shaped filter screens which are suspended from a shaking mechanism, rendered easy of operation by means of balance weights.

Interior Illumination

The interior of the working chamber of the booth is illuminated by the fluorescent light fitting, which is concealed behind the scroll running horizontally across the top of the working chamber. The interior of the chamber is cellulose enamelled white and the result is a perfectly soft light in which every encouragement for good enamelling or spraying is afforded. Ultimately, the booth will be available in three standard sizes, ranging from 3 ft. 6 in. to 4 ft. 6 in. wide. Obviously there will be an alternative design of the back-to-back variety.

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

SEPTEMBER 29.

Institute of Welding (Eastern Counties branch):—Visit to Welding Research Laboratory, Cambridge, at 2.30 p.m.

OCTOBER 2.

Institute of Welding (Liverpool branch):—"Welding Shop Layout," by W. A. Roy.

OCTOBER 3.

Institute of Welding:—Sir William J. Larke Medal Prize Paper, "The Fabrication of Aircraft Fuel Tanks in Aluminium Alloy Containing 3 per cent. Magnesium," by W. K. B. Marshall. At the Institution of Civil Engineers, Gt. George Street, London, S.W.1, at 6 p.m.

OCTOBER 4.

Institute of Welding (N.E. Tees-side branch):—Films relating to welding in general. At the Cleveland Scientific and Technical Institute, Corporation Road, Middlesbrough, at 7.15 p.m.

Institute of Welding (Portsmouth branch):—"Welding of Aircraft Structurals in Great Britain and U.S.A.," by G. F. Clipsham. At the Mechanical Training Establishment Flathouse, Portsmouth, at 7 p.m.

OCTOBER 5.

Institute of Welding (South London branch):—Paper by H. W. G. Hignett. At the Edric Hall, Borough Polytechnic, Borough Road, London, S.E.1, at 7.30 p.m.

Keighley Association of Engineers:—"Salt Bath Heat-treatment," by D. Thomas. At Devonshire Buildings, Devonshire Street, Keighley.

Institute of British Foundrymen

SEPTEMBER 29.

Bristol branch:—Visit to works of Willey & Company, Limited, Exeter, at 10.45 a.m. "Die Casting," by J. Gale. At the Imperial Hotel, Exeter, at 3 p.m.

East Midlands branch:—"Mechanised Production of Blackheart Malleable Castings," by A. B. Bill and J. Peers. At the Technical College, Derby, at 6 p.m.

HIGH TENSILE STEEL FOR CASTINGS*

Analogies with forged steel provide useful pointers for progress

By W. WEST, C. C. HODGSON and H. O. WARING

(*Continued from page* 52.)

Relationship Between Type of Primary Structure and Mechanical Properties

The kind of primary crystals and the way in which they are arranged varies according to metal temperature, method of running, shape of casting, and other variables; this has been well illustrated in a recent Paper[9] by Gray. Considering test-blocks, for example,

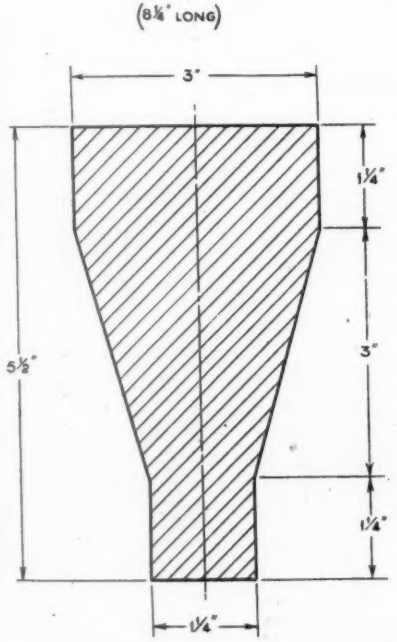

FIG. 7.—CROSS-SECTION OF TEST-BLOCK.

depending on the casting conditions, a variety of structures can be obtained from completely columnar-dendritic (Fig. 8) to almost entirely small equi-axied crystals (Fig. 9), or an intermediate type (Fig. 10).

The influence of primary crystal type on mechanical properties seems to vary with the kind of steel and the heat-treatment it has received. The more highly alloyed the steel, or the harder its condition, the greater seems to be the tendency for marked columnar crystals to reduce both the ductility and the Izod

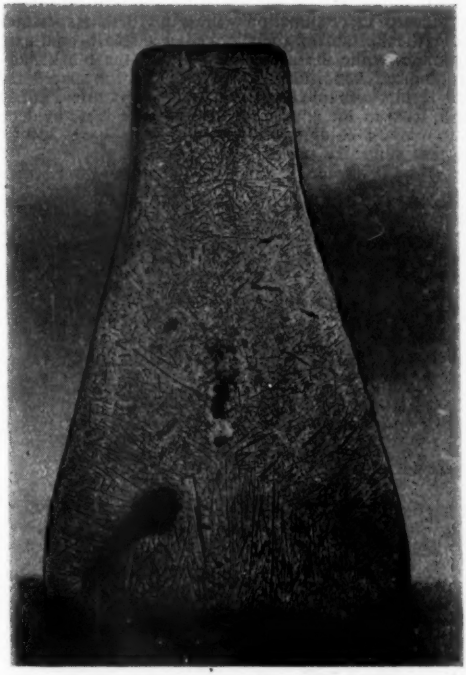

FIG. 8.—SHOWING COMPLETELY COLUMNAR STRUCTURE IN A TEST-BLOCK.

value, at least when the direction of maximum growth lies at right angles to the axis of the test-piece. This is an opinion based on the examination of a large number of tensile and Izod fractures, and not a statement made after considering the results of a full investigation into the problem.

* A Paper read before the Lancashire branch of the Institute of British Foundrymen, Mr. Stanley Brooks presiding. The Authors are on the staff of Leyland Motors, Limited.

High Tensile Steel for Castings

An investigation of the influence of primary crystallisation on the Izod value has been made on manganese-molybdenum steel used in the normalised and tempered condition. The test-block shown in Fig. 7 cast open-top in oil sand moulds was used, or a slightly modified pattern, similar in general dimensions but with the sides of the head sloping all the way from the wide, open top to the narrow coupon at the bottom, as shown in Figs. 8 to 11. From amongst a considerable number of tests a few selected from some of the test-blocks of intermediate type (Fig. 10) are given in Table IV. The specimens were prepared as shown in Fig. 11, it will be seen if this illustration is considered in conjunction with Fig. 10 that specimens from the bottom of the block had a small, equi-axied structure, while those from the top of the block had a pronounced dendritic structure. It is considered that the results obtained establish that for this kind of steel, used in the conditions stated, there is no evidence that marked columnar primary crystals have any important influence on the Izod value.

Heat-treatment

There are only two main essentials for satisfactory heat-treatment of steel; first, the means of heating the

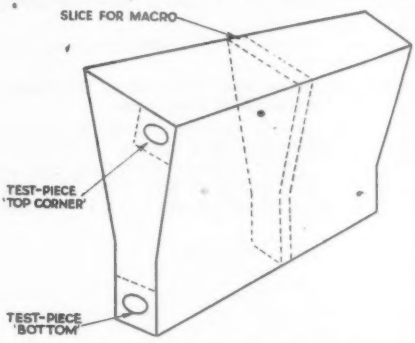

FIG. 11.—MODIFIED TYPE OF TEST-BLOCK USED.

FIG. 9.—SHOWING ALMOST ENTIRELY SMALL EQUI-AXIED CRYSTALS.

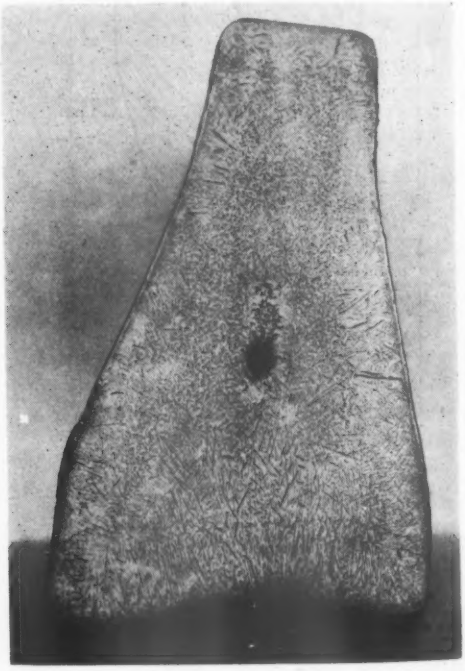

FIG. 10.—SHOWING A TYPE INTERMEDIATE BETWEEN THOSE SHOWN IN FIGS. 8 AND 9.

TABLE IV.—*Relationship between Primary Crystal Structure and Mechanical Properties.*
Preliminary Treatment.—Normalised 900 deg. C., and softened 640 deg. C.
Specimens ¾ in. thick cut from centre of block for macro (see Fig. 11).
Final Treatment of Remaining Parts of Test-block—Normalised 850 deg. to 860 deg. C. Tempered 600 deg. to 610 deg. C. Water quenched.

Chemical Composition.						Macrostructure.	Mechanical Properties.			
C.	Si.	Mn.	Ni.	Cr.	Mo.		Y.P., Tons per sq. in.	U.T.S., Tons per sq. in.	E. Per cent.	Izod, Ft. lb.
0.23	0.32	1.38	0.65	0.09	0.32	Columnar				44, 45
						Equi-axied	29.4	42.4	21	44, 41
0.26	0.43	1.53	0.87	0.12	0.33	Columnar				41, 39
						Equi-axied	36.0	51.2	17	31, 31
0.26	0.45	1.37	0.96	0.17	0.32	Columnar				36, 35
						Equi-axied	38.8	49.0	17	25, 25
0.24	0.30	1.46	0.85	0.15	0.31	Columnar				30, 29
						Equi-axied	34.5	45.5	20	39, 40
0.25	0.42	1.53	0.85	0.16	0.33	Columnar				38, 39
						Equi-axied	40.4	52.0	16	36, 31

article uniformly to the required temperature without excessive scaling or decarburisation, and secondly, the ability to cool the heated article at the required rate.

To say that a furnace capable of producing a uniform temperature throughout the charge (or, in the case of a continuous furnace, in the article to be treated) is a first essential towards satisfactory heat-treatment may sound like repeating a trite truism, but it cannot be too strongly emphasised that many of the older, large, batch-type, annealing furnaces are not suitable for quenching and tempering operations unless they are filled in a manner which is entirely uneconomical. In practice the last-mentioned proviso is hardly ever met, rather the reverse, for such furnaces are often pressed into service when heat-treatment capacity is short and when, consequently, the temptation to overload them is great. A continuous furnace is the ideal piece of equipment for heating castings of the weight and size under discussion, because by this means the second of the two postulated essentials is most readily met, but this does not mean that quite satisfactory normalising or hardening cannot be done from batch-type furnaces, it can, provided the furnace is charged in such a way that uniform heating is possible and, perhaps this is more important still, the circulation of the cooling medium (whether this be air, oil, or water) must make possible the attainment of the required minimum cooling rate.

Preliminary Treatment

It is good practice to carry out a preliminary homogenising treatment before proceeding to the hardening (or normalising) and tempering operations. The homogenising treatment can be done quite well in large, batch-type furnaces. The temperature attained by the castings should be between 900 deg. and 950 deg. C., or even as high as 975 deg. C. will do no harm provided it can be accomplished without excessive scaling. The ill-effects of overheating are well known, as everybody has had them dinned into his ears, but this is no doubt to a large extent a legacy of the experience when hardening carbon tool steel, where it is a reality, and may be regarded more as a bogey when annealing steel castings. Indeed it is highly probable that more brittle steel castings are produced by the use of too low an annealing temperature than by the use of one that is too high. Apart from any other advantage that may be conferred on the castings, a preliminary heat-treatment is of assistance if much dressing with pneumatic hammers is required, because many of the high-strength steels are distinctly hard in the "as cast" condition. When softening is one of the objects, normalising and tempering, which can be done quite conveniently in the car-bottom, batch-type furnace without unloading, is usually more efficacious than annealing.

High Tensile Steel for Castings

Hardening

A small crystal grain size and sorbite derived from homogeneous martensite, rather than from tempered transition products, are generally agreed as necessary conditions in the production of hardened and tempered steel having the best all round mechanical properties. This used to be considered as setting a rather small range on the temperature above the Ac3 point that could be used if optimum grain size was to be obtained, but it is now possible to use a temperature considerably higher than the theoretical one without seriously influencing the result, provided that care was taken during the steel-making operations to ensure steel having inherently fine grained characteristics; this has already been touched on when speaking of the influence of aluminium. Whether martensite or transition products will be formed during quenching depends on the chemical composition of the steel and the cooling rate. To have the cooling as uniform as possible is obviously desirable, and to ensure the free circulation of cooling medium there is a clear case for carefully thought-out disposition of castings in charges that are to be bulk-quenched.

For the steels under discussion it is considered that oil quenching is more satisfactory than water quenching. For a variety of reasons, usually connected with cost or with domestic difficulties in the cooling of a quenching liquid, hot water is sometimes used for quenching, but this seems to have very few advantages and a number of disadvantages when compared with quenching in a suitable type of quenching oil efficiently cooled.

A good quenching oil should decompose as little as possible in contact with the hot steel being quenched; for this reason mineral oil is preferred to fish oil, and general considerations would seem to indicate the choice of a paraffinic type of base. In order to cool the steel efficiently, the hot oil must be able to move quickly from the surface, and to be replaced by fresh oil; this requires that the oil should be of fairly low viscosity. Fire risks require a reasonably high flash point. These three properties, chemical stability, viscosity, and flash point, together with a desire that the oil should not contain hydrocarbons which evaporate at a relatively low temperature, constitute the primary requirements in a quenching oil.

Tempering

Tempering does not call for any comment except an observation on temper brittleness. If the steel is of a composition which is known to be susceptible to temper brittleness the necessity for quenching after tempering is indicated; for reasons of cleanliness water will generally be used as the quenching medium. The presence of molybdenum in amounts over about 0.2 per cent. is generally regarded as rendering the usual types of constructional steels immune from temper brittleness, and whilst this is true for wrought steels and usually for cast steel, it does not always hold good in the case of steel castings. So far as the Authors are aware, the reason for this difference in behaviour has not been established, but as a plausible hypothesis they suggest the greater homogeneity of

TABLE V.—*Mechanical Properties of 1 per cent. Manganese Steels (containing Residual Alloys).*
Size of Specimens when Treated.—1½ in. × 1½ in. × 4½ in.
Preliminary Treatment.—Normalised 900 deg. C.

Cast No.	Chemical Analysis.					Mechanical Properties.											
						Normalised 850 deg. C. Tempered 600 deg. C. W.Q.						Oil-hardened 850 deg. C. Tempered 600 deg. C. W.Q.					
	C.	Mn.	Ni.	Cr.	Mo.	Y.P. Tons per sq. in.	U.T.S. Tons per sq. in.	Yield Ratio. Per cent.	E. Per cent. on 2 in.	R/A. Per cent.	Izod, Ft. lb.	Y.P. Tons per sq. in.	U.T.S. Tons Per sq. in.	Yield Ratio. Per cent.	E. Per cent. on 2 in.	R/A. Per cent.	Izod, Ft. lb.
A3251	0.22	1.01	0.82	0.13	0.18	28.4	35.6	80	31	57	68/72	31.9	38.4	83	29	58	69/69
A3252	0.21	0.99	0.75	0.15	0.19	27.2	34.0	80	33	63	94/98	28.4	37.0	77	30	60	87/90
A3254	0.21	1.02	0.81	0.13	0.17	27.5	35.2	79	32	61	69/83	32.6	38.1	85	30	62	81/85
A3255	0.23	1.27	0.81	0.12	0.18	28.1	39.8	70	30	58	84/88	36.2	43.7	82	25	54	75/75
A3256	0.21	1.04	0.92	0.14	0.16	27.2	36.4	75	32	60	60/72	33.0	39.8	82	29	60	61/63
A3257	0.21	1.10	0.96	0.12	0.16	31.1	39.2	80	28	54	60/62	34.8	42.9	81	26	56	61/62
A3258	0.21	1.10	0.72	0.09	0.21	28.0	36.6	79	33	65	95/95	32.3	39.0	83	29	60	89/91
A3259	0.19	1.08	0.74	0.09	0.21	29.0	36.6	79	31	61	78/80	33.6	40.8	83	26	57	79/81
A3260	0.21	1.11	0.72	0.13	0.17	28.0	36.0	81	31	58	64/67	31.8	38.6	82	27	56	60/60
A3261	0.20	1.10	0.70	0.14	0.17	29.2	37.4	78	31	59	77/80	33.6	40.5	83	29	62	77/83

TABLE VI.—*Manganese-molybdenum Steel.*
Normalised and Tempered.
Casting Weight 122 lb. Maximum Section 2 in.

Chemical Composition.					Mechanical Properties.							
					Test-block.				Casting.			
C.	Mn.	Ni.	Cr.	Mo.	Y.P. Tons per sq. in.	U.T.S. Tons per sq. in.	E. Per cent.	Izod, Ft. lb.	Y.P. Tons per sq. in.	U.T.S. Tons per sq. in.	E. Per cent.	Izod, Ft. lb.
0.23	1.38	0.65	0.09	0.32	32.2	40.1	24	60	27.0	37.8	24	57
0.27	1.52	0.90	0.13	0.17	29.8	40.2	28	69	32.0	40.8	22	56
0.22	1.58	0.75	0.11	0.29	31.0	41.2	26	63	34.5	42.4	20	30
0.25	1.37	0.76	0.11	0.23	32.4	41.6	20	35	30.8	40.8	11	25
0.32	1.40	0.80	0.15	0.27	36.8	46.2	20	49	34.0	42.6	18	36

wrought steel as a reason for its more satisfactory behaviour. It is the Authors' practice to quench all alloy steel castings after tempering, irrespective of their chemical composition.

Mechanical Properties

The permissible ultimate tensile stress to be obtained from any particular type of steel is governed to a large extent by the ductility required. When the object

TABLE VII.—*Mechanical Properties of Alloy Steel Castings.*
Quenched and Tempered to give 45 to 50 tons per sq. in. Ultimate Tentile Stress on Test-bar.
Test-bar 1¼ in. × 1¼ in.
Casting Weight 206 lb. Maximum Section 2½ in.
Columns Headed 1. Test-bar results. Izod average of three notches.
" " 2. Lowest result obtained from a casting, specimens taken from four different places, Izod lowest of 12 notches.
" " 3. Highest result obtained from a casting, specimens taken from four different places, Izod highest of 12 notches.

Chemical Composition.					Mechanical Properties.																
					Y.P. Tons per sq. in.			U.T.S. Tons per sq. in.			Yield Ratio.			Elong. Per cent.			R. of A. Per cent.			Izod, Ft. lb.	
C.	Mn.	Ni.	Cr.	Mo.	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.	3.	1.	2.	3.
0.23	1.55	1.04	0.21	0.32	39.9	35.3	35.6	47.2	43.6	44.1	84.5	80.4	81.1	20	15	22	44	28	44	73	80	87
0.26	1.48	0.94	0.11	0.36	40.9	38.9	49.9	49.0	43.7	48.1	83.5	84.1	89.1	20	13	16	40	18	34	66	65	73
0.30	0.86	0.68	1.00	0.30	38.8	38.8	39.3	49.8	48.5	49.4	78.0	79.5	80.0	17	16	18	35	20	38	51	36	42
0.23	0.70	0.50	0.82	0.25	35.3	35.2	36.2	45.1	42.2	46.0	78.2	78.8	83.5	16	8	17	33	15	33	56	38	60
0.30	1.20	1.30	0.14	0.19	37.8	35.8	36.8	47.8	44.8	46.9	79.2	78.5	80.0	20	10	22	38	27	42	65	61	68
0.30	1.23	1.54	0.10	0.16	37.4	35.2	38.2	47.2	44.5	47.1	79.3	79.2	81.9	19	13	21	39	27	33	52	53	60
0.24	0.76	2.14	0.21	0.20	36.8	35.6	35.7	45.1	42.6	43.1	81.5	82.8	83.6	21	16	24	48	31	54	80	70	82
0.24	0.91	1.70	0.21	0.15	36.4	36.3	37.7	45.4	44.2	45.0	80.3	82.0	84.4	24	21	25	51.5	31	52	76	73	80

High Tensile Steel for Castings

is to make castings that are in the toughest condition, it is not possible to obtain from a steel all it is capable of in the matter of ultimate tensile stress. The object here was to have not only strong but tough castings, and the ultimate tensile figures may, therefore, appear to some to be on the conservative side. There is a good deal of argument about the value of the Izod test; it is regarded here as a valuable one, and looked on as a ready means of assessing (and expressing as a number), that quality of the steel which is judged in the eminently practical test of breaking up a casting and noticing the manner of breaking and the appearance of the fracture, or by notching a bar and breaking it in a vice.

The Izod values of medium manganese steel (1 to 1½ per cent. with residuals) may vary widely. The steel appears to be affected by variations in the steel-making practice, and if used in the annealed or normalised condition the Izod value of some casts of steel can be considerably improved by tempering. The presence of small amounts of residual elements,

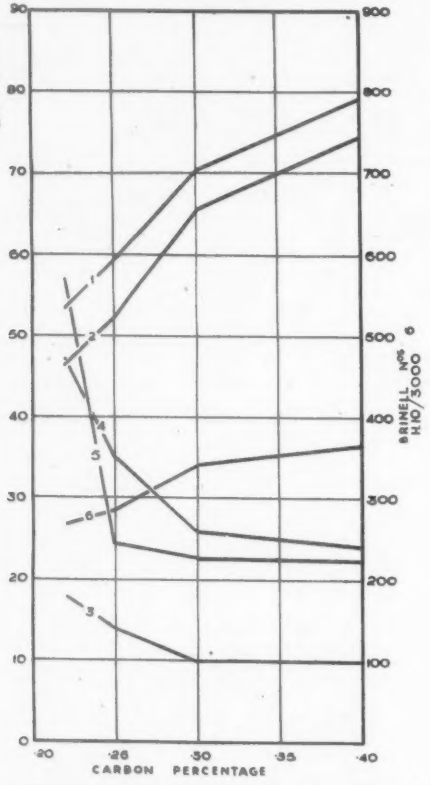

FIG. 12.—INFLUENCE OF CARBON ON THE MECHANICAL PROPERTIES OF 1 PER CENT. CHROMIUM-MOLYBDENUM STEELS.
Specimens, 1½ in. by 1½ in. by 4½ in. 850/860 deg. C. O.Q. Tempered 550 deg. C. (1) U.T.S. (T.S.I.); (2) Y.P. (T.S.I.); (3) E % on 2 in.; (4) R/A %; (5) Izod (ft.-lb.).

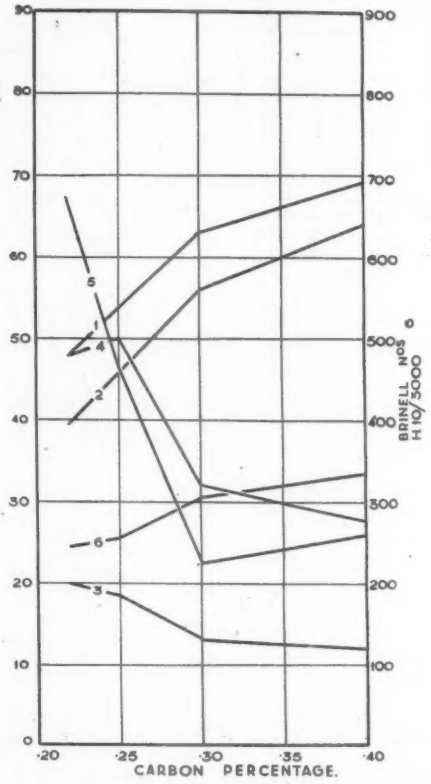

FIG. 13.—INFLUENCE OF CARBON ON THE MECHANICAL PROPERTIES OF 1 PER CENT. CHROMIUM-MOLYBDENUM STEELS.
Specimens, 1½ in. by 1½ in. by 4½ in. 850/860 deg. C. O.Q. Tempered 600 deg. C. (1) U.T.S. (T.S.I.); (2) Y.P. (T.S.I.); (3) E % on 2 in.; (4) R/A %; (5) Izod (ft.-lb.).

Ni, Cr and Mo, improve the uniformity of this steel. The chemical composition and mechanical properties of a number of typical casts are shown in Table V in the normalised and tempered and quenched and tempered conditions. It will be seen that the manganese content has been reduced to allow for the residuals present.

Manganese-molybdenum steel has much to recommend it as a material from which to make strong, tough steel castings. In addition to its use in the quenched and tempered condition, it has the advantage of responding well to the simpler treatment of normalising and tempering, so that a simpler treatment can be used when facilities for the full quenching treatment are not available. Tempering after normalising is essential for manganese-molybdenum steel (and for that matter after annealing also if it should be necessary to use this steel in that condition); a notable improvement in ductility and toughness, gained at the expense of some loss of strength, follows tempering. Some typical results are shown in Table VI. Variations in tempering temperature have the same effect on quenched material as on wrought steels, and the usual range is from 550 to 650 deg. C. A number of the steels used are more or less interchange-

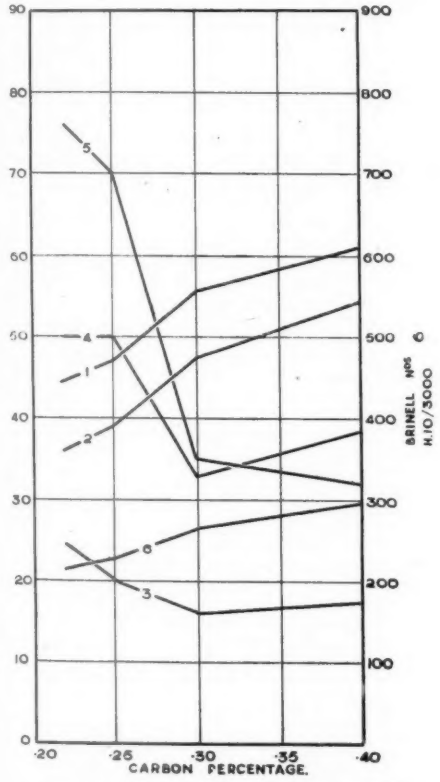

FIG. 14.—INFLUENCE OF CARBON ON THE MECHANICAL PROPERTIES OF 1 PER CENT. CHROMIUM-MOLYBDENUM STEELS.
Specimens, 1½ in. by 1½ in. by 4½ in. 850/860 deg. C. O.Q. Tempered 650 deg. C. (1) U.T.S. (T.S.I.); (2) Y.P. (T.S.I.); (3) E % on 2 in.; (4) R/A %; (5) Izod (ft.-lb.).

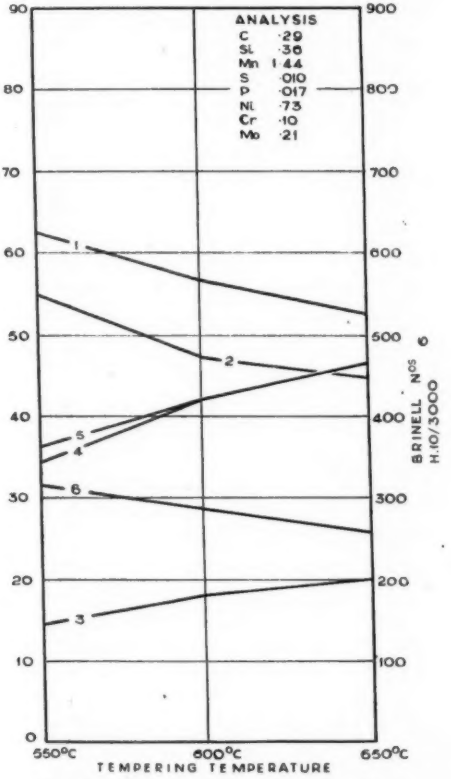

FIG. 15.—INFLUENCE OF TEMPERING TEMPERATURE ON CAST STEEL.
Specimens, 1½ in. by 1½ in. by 4½ in. 850/860 deg. C. O.Q. Tempered as shown. (1) U.T.S. (T.S.I.); (2) Y.P. (T.S.I.); (3) E % on 2 in.; (4) R/A %; (5) Izod (ft.-lb.).

High Tensile Steel for Castings

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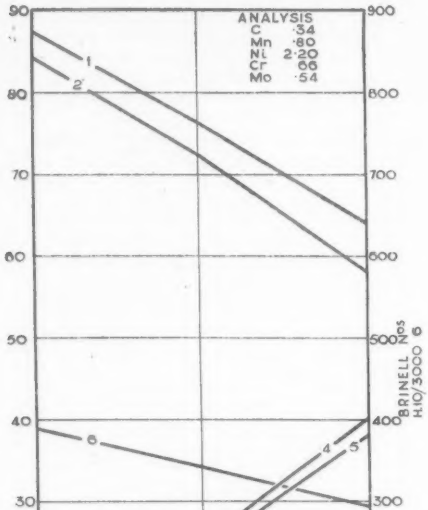

FIG. 16.—INFLUENCE OF TEMPERING TEMPERATURE ON CAST STEEL.
Specimens, 1½ in. by 1½ in. by 4½ in. 850/860 deg. C. O.Q. Tempered as shown. (1) U.T.S. (T.S.I.); (2) Y.P. (T.S.I.); (3) E % on 2 in.; (4) R/A %; (5) Izod (ft.-lb.).

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More attention has been paid by engineers latterly to the properties of the material delivered to them in the casting as distinct from the results obtained from test-bars. This trend should be welcomed, and in the long run it should be to the advantage of both the foundryman and his customer. At the same time every effort should be made by the former to convince the latter that the best steel casting (unless it be of the most simple shape), is likely to contain some minute shrinkage cavities, and that if these occur near the surface of a tensile test-piece the values obtained for elongation and reduction of area are bound to be affected adversely. In the Authors' experience the Izod test is affected much less by the presence of such interdendritic shrinkage cavities than is usually the case with tensile tests. Considerably more might be done, they feel, to extend the use of Brinell hardness and Izod tests to supplement the older tensile and bend test-pieces, or even to replace them for certain applications. A number of the results reported in this Paper enable a comparison to be made between the mechanical properties of separately cast test-bars and the mechanical properties of castings which they represent.

Chemical Composition

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When outlining the scope of the Paper it was indicated that the steels to be considered would include carbon-manganese steel (with residual alloys), equivalent to about 1.5 per cent. manganese, manganese-molybdenum steel (1½ per cent. Mn), chromium-molybdenum (1 per cent. Cr), 2½ per cent. nickel-chromium-molybdenum, and non-standard steels containing rather large amounts of residual elements. The greater part of the steel made has been of either the manganese or manganese-molybdenum varieties (the

(*Continued on page* 80, *column* 2.)

SOUTH AFRICAN FOUNDRYMEN ELECT NEW OFFICERS

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The South African branch of the Instititute of British Foundrymen held their annual dinner and general meeting at Johannesburg on June 28 last, when there was an attendance of 80 members. At an early stage in the proceedings the meeting rose for a few moments in honour of members of the armed forces who had lost their lives.

After the loyal toast had been honoured, the president (Mr. P. L. Ward) extended a warm welcome on behalf of the branch to the guests of the evening, amongst whom were: Dr. W. A. Rowe, Director of the Witwatersrand Technical College; Prof. L. Taverner, Director, Government Metallurgical Laboratory, University of the Witwatersrand; Mr. R. G. Thomas, president of the Institution of Certified Engineers (S.A.); Mr. W. E. John, president of the South African Institute of Engineers; Mr. B. J. Louis Bok, president of the Chemical and Metallurgical and Mining Society of South Africa; Mr. Douglas Cullinan, a director of the Consolidated Rand Brick, Pottery & Lime Company, Limited; and Mr. R. N. Norris, managing director of African Malleable Foundries, Limited.

Replying on behalf of the guests, PROF. L. TAVERNER emphasised that foundry work was one of the earliest branches of the metallurgical industry, and he expressed the opinion that in a country such as South Africa members of the Institute had a very great opportunity for advancing the standard of foundry work, which must be a science as well as an art. Starting in a new country, foundrymen had an opportunity to develop their industry on scientific lines as well as in craftsmanship. As time went on, they would find that science played an ever-growing part in the development of foundry practice. Craftsmanship and its value must necessarily be associated with the scientific side as that art developed. In recent years it had been realised overseas that foundry work lagged slightly behind on the scientific side as compared with other aspects of metallurgy. There was no reason for that. Progress was handicapped in countries where the craft was handed on from generation to generation. Members of the branch had an opportunity of developing the foundry industry on modern lines.

Wartime Developments of the Foundries

Replying to Prof. Taverner on behalf of the branch, MR. D. LION-CACHET said he considered that there were three phases in the development of the foundry industry in South Africa—before, during and after the war. Before the war, foundrymen had been engaged mainly in making spare parts for broken-down machines. This phase lasted for many years till war broke out. When defence production started members got together and pooled ideas, bringing their boxes and cores for bombs to meetings. The old spirit of cut-throat competition was replaced by a spirit of good fellowship. Metallurgical problems had to be investigated. Production was undertaken with the crude methods and tools at their disposal, but they managed to make bombs. He had subsequently heard on good authority that they were not merely good bombs but were actually the cheapest made in the Empire. That was due largely to co-operation and the pooling of resources. Eventually VE-Day came. Now the industry was entering upon the third phase —the post-war phase. In the years to come they would have to struggle much harder than during the war. Not only would they have to increase production and bring their organisation more up to date, but they would have to go on to the metallurgical side and decide what were the right metals for particular jobs.

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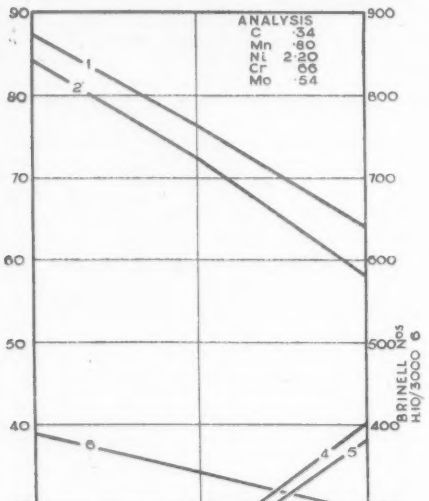

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South African Foundrymen

a total membership of 187. Whilst dealing with the subject of membership and activities of the Institute, it is pleasing to record that the Cape section of the Institute is growing from strength to strength, thus indicating that the section fills an important and long-felt want in that area. The success of the Cape section is due in no small degree to the energies of its secretary, Mr. Zwanziger, and to the enthusiasm of the Cape local members, and they deserve a hearty vote of thanks for achieving so much in so short a time. The Durban section is also functioning and maintaining its record.

Publication of Proceedings

Your Council decided to publish a further annual volume of proceedings, despite limitations imposed on its size by the Paper Controller. The volume has already been released to members and contains some selected Papers delivered to the Institute. It is hoped that with the restrictions in paper control being removed, the next volume of proceedings will be of a size commensurate with the activities of the Institute and so provide an annual record in detail which will have an important reference value.

As members are aware, the Institute has been considering a research of likely foundry sands with a view to their possible location. In this regard the Council's thanks are due to the advice of Prof. Taverner, who has represented the Government Metallurgical Laboratory of the University of the Witwatersrand. Your Council has for the time being decided to suspend proceedings with the project pending clarification of the proposed set-up of the Scientific Research Council, recently provided for under the newly promulgated Scientific Research Council Act. Your incoming council will no doubt have the honour of seeing the initial research work launched immediately all preliminary details have been satisfactorily taken care of.

I would like at this stage to place on record the publicity given the meetings and Papers of the Institute by the "Engineer and Foundryman." We are pleased to have its editor, Mr. Thomson, numbered among our guests and we take this opportunity of showing our appreciation of his valued services in no uncertain a manner. To those kindred organisations and societies which have accepted our invitations to be present with us this evening, I wish on behalf of the Council and members to express our good wishes. The Council has been advised by S.A.F.E.M.A., in whose offices the Institute is housed, that a permanent lecture room for the Institute has now been provided. The accommodation will be spacious and will have permanent facilities for the screening of films, and other amenities.

I would like to pay tribute to the co-operation and assistance rendered to me by the vice-president and other members of the Council during my period of office. They have made my task both pleasant and the more easy and I am certain that if your incoming president is accorded the same support from Council and members alike his task will also be one of extreme pleasure.

Phase one of the war has ended, and we hope that phase two in the eastern theatre will not be far distant. The advent of peace will be accompanied by the twin problems of reconstruction and rehabilitation. South Africa is on the verge of a new industrial era, and its problems of the peace will be no less complex than those of other countries in the world. The will and desire to succeed are not the least important; otherwise all the blue prints and plans will be of little avail. The impelling force of desire to succeed must, however, be tempered with the realities of the situation and both theory and practice must be regarded as natural and complementary driving forces within the whole scheme of things. It is within this range that the work of the Institute will play an ever increasing role, and the contribution to the industry which it serves will not be inconspicuous.

MR. TONGE proposed a hearty vote of thanks to the president, whom he congratulated upon a most successful period of office, which reflected the enthusiastic support received from all who had been privileged to attend the meetings.

MR. NIMMO DEWAR said he was proud and happy to have been associated as a foundryman in South Africa with the contribution which the industry had made to victory over Hitler's Germany. The president had indeed been fortunate in that during his year of office they had seen the conclusion of that struggle in which they had all been participating. Throughout the war years foundrymen had been pushing forward the production of munitions and weapons. It was a source of congratulation that a small country like South Africa should have made such a worthy contribution to Allied defence. Mr. Nimmo Dewar referred to the San Francisco Charter and to the four freedoms outlined by the late President Roosevelt. He was happy to know that South African foundrymen were now in a position to play their part in bringing about that better world to which they all looked forward. It was a great pleasure to him to support the remarks of Mr. Tonge and other speakers. He was confident that in the better times to come the foundry industry would play an important part.

Balance Sheet and Expenditure Accounts

The hon. secretary, MR. DRUMMOND, gave the meeting a *résumé* of the balance sheet and expenditure accounts. Col. Grose moved the adoption of the balance sheet. MR. HOLDSWORTH, in seconding the motion, said the figures showed that the branch was not out to make money but solely to promote the good of the industry.

On the motion of the president, seconded by Col. Grose, Francis, Dix, Bird & Company were reappointed auditors for the coming year.

Vacancies on Council

The president stated that only four nominations having been received by the closing date for four vacancies to the Council, the retiring members, F.

Bullock, A. H. Mackay and J. H. West were re-elected, the fourth vacancy being filled by Mr. E. Hepple.

Election of President

MR. WARD said that it was his pleasant duty to hand over the presidency to the Council's nominee, Mr. H. Holdsworth, who had been a member of the Institute of British Foundrymen since 1927 and was the oldest member in the country except for one member in Natal.

MR. HOLDSWORTH, on taking the chair, said that he was very proud to have been elected president for the ensuing year. He would do his best to maintain the standards and would try to better them. Mr. Ward had very truly predicted that the country was on the eve of a new industrial era. Therefore he appealed to the heads of firms and their representatives to come to meetings and give their views as to the successful completion of a casting or castings. The Institute had done much to break down the reserve of some of the foundries and prove to others, who considered they had secret methods of production, that not only were their methods not secret but they were in many instances obsolete. The readiness of firms to welcome the visits of the Institute went to prove that point. It was also a fact that the benefits gained were not confined to the visitors only. He thanked the Institute for the honour that had been accorded him.

Vice-president

MR. HOLDSWORTH said that it was his pleasant duty to nominate as vice-president, Col. W. J. Grose. He had worked with Col. Grose since the inception of the branch and had found him an ideal colleague, always willing to help and to take part in the discussions at meetings, to which he often contributed interesting problems.

Presentation

The next item was a presentation to the former secretary of the branch, Mr. B. P. Skok. In making the presentation, MR. TONGE said that the branch had been particularly fortunate in their secretaries. They all appreciated the sound work which had been done for the branch by Mr. Skok, who had always taken a keen interest in its proceedings and now had become a member. On behalf of the branch he had very great pleasure in asking Mr. Skok to accept a small token with their very best wishes.

MR. SKOK thanked Mr. Tonge for his very kind remarks and said that no task he had ever undertaken had been more pleasant than that of acting as hon. secretary to the branch. He stressed the spirit of co-operation and friendliness, which he felt was the cause of the branch's success, and which made him very sanguine as to its future. It had been a very great privilege to have been associated with such an organisation.

Importance of Sand Research

COL. GUY said that his firm had supplied three presidents to the branch. He considered that the attendance that evening showed that the Institute was very necessary for the foundry industry. He felt foundrymen could claim to have met all the demands which they had been called on to fulfil. Apparently, they had not only produced all they had asked for but had even produced some articles more cheaply than in other countries. Sand was the foundation of the foundry industry. He was perturbed that the industry was waiting to see what the Government was going to do. He proposed that if necessary they should carry out the research at their own expense. He hoped there would be no holding back on this most important question and would like Prof. Taverner to go away knowing that he had the wholehearted support of the industry. He had no doubt that under Mr. Holdsworth's leadership the foundry industry would make great progress. The foundry was the foundation of the engineering industry. He congratulated Mr. Ward on the great progress made during the past 12 months. He wished Mr. Holdsworth the greatest success and hoped that all members would rally round him as he deserved.

CAPT. JENKINS thanked the branch for keeping men like himself and Lieut. Simpson, who had been on active service, in good standing with their subscriptions, and expressed his pleasure at his reunion with old friends.

The president thanked Capt. Jenkins for his remarks, and said the least the branch could do for men on active service was to keep them in good standing.

POWER REQUIREMENTS IN ALLOY STEEL ROLLING

In the course of a discussion which followed the reading of a Paper entitled "Rolling Alloy Steels," before a meeting of the Association of Iron and Steel Engineers by C. P. HAMMOND and A. M. CAMERON, a speaker (R. H. WRIGHT), referring to the relative power requirements for rolling alloy ingots and low-carbon ingots, said there were, of course, many alloys requiring a considerable range of rolling temperatures. If all alloys could be heated to 2,200 deg. F., the power required in the blooming mill would not be much greater than for low-carbon steel. In general, alloy steels would require about 25 per cent. more power because they must be rolled at lower temperatures. The soaking temperature of low-carbon ingots could vary 100 deg. or more without much effect on the rolling power. On the other hand, 100 deg. lower soaking temperature had a marked effect on the power required for rolling high-carbon and alloy steels.

JOHN SUMMERS & SONS, LIMITED, announce that notice has been given to redeem the £1,828,873 4½ per cent. first mortgage debenture stock at 102, plus accrued interest, on December 15 next. An issue of preference shares will be made to provide the necessary funds. Ordinary stockholders will be asked at an early date to approve an increase in the authorised capital by the creation of preference shares.

COMMENTS ON A PATTERN

By "W. G."

The pattern shown in the sketch is one that, if it had been made in halves, would have simplified moulding operations. This not being so, much time and skill were expended in moulding from it in its present form. With the pattern in halves, one of them could be rammed up in the top part of the box, thereby eliminating an irregular parting, thus leaving the moulder a flat joint when a few gaggers would suffice round the pattern to hold the sand firmly in the top part when it is turned over for the purpose of closing. Instead, he is compelled to make a step-joint, starting at the top of the pattern and parting down each side of it to where the bosses are attached. This means, first, cutting out a depression round each boss, 4 in. deep by 5 in. wide, which in the next operation must be carefully rammed, the sand secured

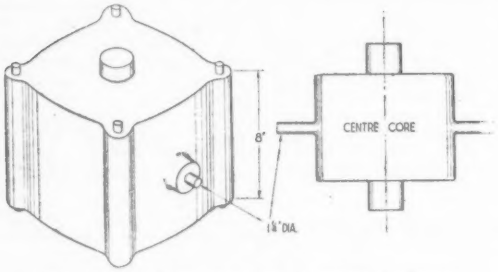

FIG. 1.—A POOR TYPE OF PATTERN CAUSING FOUNDRY TROUBLES.

by skilfully placed gaggers hooked on the bars of the top part and lifted away with it. The pattern is rapped through the top part to ensure an unbroken parting, although this precaution is not always a time saver.

The five core prints, it will be observed, stand 1 in. high and are shaped minus any degree of taper and an unbroken parting round these is not always the rule, as it would be with tapered prints. The ⅞-in. cores are 10 in. long and are sawn from extruded lengths, and ¼ in. of the top of each core is given a liberal taper by the moulder so as to guide them centrally in the prints while the top part is lowered in position.

As more than a dozen castings have been made from this pattern, it will be easy to form some idea of the time that could be saved if the pattern had been made in halves. It will be understood, therefore, that the skilled moulder is quick to see the simplified alternative and passes his comments on to his mate with the question, "Why do they make them this way?"

[We strongly deprecate the acceptance by the industry of unsuitable patterns. Then such improvisations would not be necessary.—EDITOR.]

EXPANSION PROGRAMME OF SOUTH AFRICAN FIRM

James Barwell (South Africa), Limited, have expanded their capital from £80,000 to £230,000 by the issue of an additional 60,000 ordinary shares offered at par to existing shareholders, 40,000 ordinary shares offered at 25s. per £1 share to certain selected allied business concerns whose association with the company is likely to be mutually advantageous, and a further 50,000 preference shares to the Industrial Development Corporation of South Africa, Limited.

Among the objects of the new issue is the completion of the brass tap plant, a considerable amount of the capital originally intended for this purpose having been spent on the existing ironfoundry. It is intended to make the brass tap plant completely self-supporting in the production of every component liable to be required. The erection of a second ironfoundry twice the size of the present one is also in progress. This foundry will be 200 ft. by 180 ft., the floor space being broken up by only four supporting stanchions. The expansion programme further provides for the installation of a large hot-forging and hot-thread rolling plant.

HIGH TENSILE STEEL FOR CASTINGS

(*Continued from page* 76.)

use of chromium-molybdenum steel has been discontinued in favour of the latter). A number of the steels are more or less interchangeable, as can be seen from the mechanical tests recorded in Table VII. The really high alloy steels have been used only when castings of considerable section requiring high tensile strength were to be made.

The carbon content is held as low as possible, consistent with obtaining the necessary combination of ultimate tensile stress and ductility. A low carbon is desired because it reduces the danger of cracking and eases fettling operations, and the steel is less likely to acquire a dangerous combination of hardness and brittleness if welding has to be done at a stage when any subsequent tempering or stress relieving is no longer possible. There is, of course, a limit to this reduction of carbon, for instance when a fairly high tempering temperature is to be used (and this is generally desirable) and the ultimate stress demanded is high for the type of steel; then an increase in carbon must be made. The influence of carbon on the mechanical properties of 1 per cent. chromium-molybdenum steel is well illustrated by the curves of Figs. 12, 13 and 14.

[9] B. Gray. The Side Feeding of Steel Castings. Iron and Steel Institute. Paper No. 10/1944 of the Steel Castings Research Committee.

[10] H. Juretzek. Alloy Steel Castings, Their Properties and Application. Giesserei, 1942, vol. 29, p. 217.

[11] A Metallurgical Study of German and Italian Aircraft Engine and Airframe Parts. The Aero Component Sub-committee of the T.A.C. Kennedy Press, Limited, 1943, p. 84.

(*To be continued.*)

IMPORTS AND EXPORTS OF IRON AND STEEL IN 1945

BOARD OF TRADE RETURNS

Figures of Britain's overseas trade in the first half of 1945 are given in returns just published by the Board of Trade. In the tables below, one-half the 1938 totals is shown for purposes of comparison.

Total Imports of Iron and Steel.

From	One-half of year 1938.	Six months ended June 30.	
		1944.	1945.
	Tons.	Tons.	Tons.
British India	77,817	87,737	81,193
Canada	58,687	60,563	26,693
Other British Countries	2,816	231	247
Sweden	44,898	10	16
Norway	16,887	—	—
Germany	48,171	—	—
Belgium	136,840	—	—
Luxemburg	29,301	—	—
France	128,673	—	—
United States of America	100,346	822,102	113,075
Other Foreign Countries	27,699	517	53
Total	672,135	971,160	221,277
Iron ore and concentrates—			
Manganiferous	31,141	—	—
Other sorts	2,550,934	1,211,319	1,795,304
Iron and steel, scrap and waste, fit only for the recovery of metal	316,101	4,471	57,213

Exports of Iron and Steel By-Products.

Product.	One-half of year 1938.	Six months ended June 30.	
		1944.	1945.
	Tons.	Tons.	Tons.
Pig-iron	46,970	1,553	212
Ferro-alloys, etc.—			
Ferro-tungsten	259	16	40
Spiegeleisen and ferro-manganese	2,598	31	18,470
All other descriptions	524	217	523
Ingots, blooms, billets and slabs	4,872	102	237
Iron bars and rods	1,599	71	130
Sheet bars, tinplate bars, wire rods and bright steel bars	11,074	553	1,765
Other steel bars and rods	51,002	5,606	6,361
Special steel	2,466	1,27 7	1,319
Angles, shapes and sections	33,702	3,095	3,783
Castings and forgings	809	217	79
Girders, beams, joists and pillars	16,735	2,190	4,635
Hoop and strip	18,688	612	2,217
Plates ¼ in. thick and over	65,479	5,079	19,648
Black plates	7,269	543	542
Black sheets	31,756	760	219
Galvanised sheets	73,467	356	479
Tinplates	159,654	5,246	5,725
Tinned sheets	705	197	392
Terneplates	2,163	1,891	3,038
Decorated tinplates	2,184	341	397
Cast-iron pipes	45,945	2,172	2,983
Wrought-iron tubes	109,987	18,041	21,593
Steel rails	53,000	14,285	19,561
Sleepers and fishplates	12,691	1,562	2,018
Other railway material	13,386	1,841	2,997
Wire	27,591	1,278	2,276
Wire manufactures	14,742	2,524	2,555
Nails, tacks, etc.	1,903	3,024	2,572
Rivets and washers	4,268	453	577
Wood screws	1,256	1,268	876
Bolts, nuts and metal screws	8,766	1,520	2,187
Stoves, grates, etc.	4,575	928	1,267
Sanitary cisterns	1,406	105	195
Fencing material	2,565	58	210
Anchors, etc.	5,978	1,147	2,755
Springs	1,966	253	593
Total, including all other manufactures of iron or steel	957,601	92,504	156,981

Total Exports of Iron and Steel.

Destination.	One-half of year 1938.	Six months ended June 30.	
		1944.	1945.
	Tons.	Tons.	Tons.
Eire	27,857	7,962	9,477
Channel Islands	3,708	—	2
Palestine	4,035	1,127	1,005
British West Africa	24,870	5,249	8,315
Union of South Africa	115,537	8,078	20,567
Northern Rhodesia	10,287	3,101	1,868
Southern Rhodesia	18,105	6,232	5,502
British East Africa	12,964	1,715	4,215
British India	79,303	11,335	11,256
Burma	9,255	—	—
British Malaya	33,291	—	—
Ceylon	13,014	1,862	2,264
Hong Kong	11,796	—	—
Australia	85,417	2,095	2,659
New Zealand	65,939	4,489	2,256
Canada	42 697	276	1,185
British West India Islands	22,125	423	2,765
Anglo-Egyptian Sudan	4,145	1,219	1,363
Other British Countries	10,959	968	1,769
Soviet Union	2,175	4,866	1,483
Finland	8,785	—	—
Sweden	5,907	—	—
Norway	10,132	—	37
Iceland	329	289	593
Denmark	43,610	—	—
Germany	16,902	—	—
Netherlands	25,766	—	236
Dutch East Indies	13,650	—	—
Dutch West India Islands	1,232	213	242
Belgium	10,128	—	8,223
France	6,692	—	23,399
Portugal	3,854	494	2,280
Portuguese East Africa	7,110	105	330
Spain	3,882	79	1,440
Egypt	17,202	3,979	5,255
Iraq	12,870	662	6,936
Iran	55,190	22,428	22,273
China	11,064	339	282
Japan	3,477	—	—
United States of America	1,094	76	130
Brazil	8,495	23	1,371
Argentine Republic	39,675	61	152
Other Foreign Countries	53,076	2,759	5,572
Total	957,601	92,504	156,981

DISPOSAL OF SURPLUS MACHINE TOOLS

In order to facilitate the clearance of large factories, and to make the best Government surplus machine tools at such factories quickly available for use elsewhere, the Machine Tool Control is arranging to sell these tools direct from site at selected factories and stores.

Each factory will have a sales depot with a self-contained organisation to enable intending purchasers to inspect and purchase machines where they lie. Lists of approved merchants are available at each sales depot, as well as at the permanent disposal centres, and the services of a merchant in the selection of machines may be utilised without extra cost, as the merchants' commission is paid by the Government. These additional facilities, which are part of the Government's machine-tool disposal scheme, should prove of benefit to firms planning the re-conversion and re-equipment of their factories.

The first of these special site sales commenced at Rootes Securities, Limited, No. 2 Engine Factory, Ryton-on-Dunsmore, near Coventry, on September 26, and further sales will be notified from time to time.

NOTES FROM THE BRANCHES

SHEFFIELD BRANCH.—The opening meeting of the session was held on September 17 at the Royal Victoria Hotel, Sheffield. It took the form of a presidential address by Mr. W. H. Salmon, of Hadfields, Limited, and a smoking concert. The new president is very versatile and has managed during the war to combine his foundry activities with those of entertainments officer to his company. Those who have heard "Works Wonders" and other B.B.C. broadcasts will be well aware of the high standard reached by the programmes he has directed. Owing to illness, Mr. Barron was unable to be present and the new president was inducted into the chair by Mr. T. R. Walker, M.A., the hon. secretary.

In the course of his address, Mr. Salmon pointed to the difficulty he felt in filling an office which had previously been held by such internationally-known people as the late Sir Robert Hadfield, the late Dr. Hatfield, the late Dr. Longmuir, Dr. Hurst, Dr. Dadswell, Prof. J. H. Andrew, Mr. J. R. Roxburgh, and the hon. secretary, Mr. T. R. Walker. He regarded the present social gathering as being an opportunity for renewing acquaintanceship with those members living in nearby towns, who were prevented from attending during the war years by the great difficulty of returning home from meetings. The new president made excellent use of the second plural personal pronoun to ask for increased co-operation in the working of the branch. He felt sure that Mr. V. C. Faulkner, whom he was delighted to see present, would, as a Sheffielder, be pleased to see this branch grow beyond the size of the London branch. Holding out promises of the resumption of works visits and other activities, Mr. Salmon paid tribute to those concerns which had opened their doors for patternmaking and foundry students to see their shops, and to the guides who had so willingly given their time and experience to extend the knowledge of these young men. He was hoping to announce that the Sheffield students taking the City and Guilds of London Examination in May set up a new record of successes; 89 per cent. had passed in Foundry Practice and 100 per cent. in Intermediate Patternmaking. One student was awarded the Buchanan Prize. After asking for the maximum of help to be given to returning members of the Armed Forces, Mr. Salmon again reminded them that the object of a social evening was for increasing personal friendships with the object of improving co-operation amongst themselves.

After a cordial vote of thanks had been accorded to the president, the members settled down to enjoy a well-balanced musical concert.

WEST RIDING OF YORKSHIRE BRANCH.—The works of the Renishaw Iron Company, Limited, were visited recently by a party consisting of 90 members led by the branch-president, Mr. J. Timbrell, the vice-president, Mr. H. Balme, and the acting secretary, Mr. H. Forrest. They were received at the works by Mr. J. F. Stanier, managing director, and Mr. G. E.

(*Continued at foot of next column.*)

EARNINGS OF MANUAL WORKERS

INCREASE DURING WAR YEARS

According to statistics published in the "Ministry of Labour Gazette," average weekly earnings were 76 per cent. higher in the last pay week of last January than in October, 1938 (the latest available pre-war date). The figures are the result of an official inquiry, and they cover over 5¼ million manual workers, mostly in manufacturing industries. Average earnings (which include overtime, payment for night work, piece work, etc.) rose from 53s. 3d. to 93s. 9d. An analysis shows the following advances:—Men (21 years and over), from 69s. to 119s. 3d. (73 per cent.); youths and boys, from 26s. 1d. to 44s. 1d. (69 per cent.); women (18 years and over), 32s. 6d. to 63s. 2d. (94 per cent.); girls, 18s. 6d. to 33s. 8d. (82 per cent.).

The figures vary widely between industries, and there are marked differences as between the various industries in the proportions of skilled and unskilled workers and in the opportunities for extra earnings.

The principal industries and services not covered by the inquiry were agriculture, coal-mining, railway and shipping services, dock labour, and distributive and catering trades, entertainment, commerce and banking, and domestic service. In coal-mining, Ministry of Fuel information shows that for all classes of workpeople combined, including juveniles, the average earnings per man-shift worked were approximately 22s. 5½d. for the first quarter of 1945, compared with 11s. 5½d. for the first quarter of 1939, an increase of approximately 96 per cent. Earning figures are exclusive of the value of allowances in kind, which amounted to 10.38 of the earnings per man-shift. Average weekly cash earnings are estimated at approximately 114s. 6d., against 60s. 8d., an increase of about 89 per cent.

OBITUARY

MR. I. H. BAKER, who for many years represented British Pigirons, Limited, in the Midland area, died suddenly on August 31.

MR. CHARLES RICHARDS, governing director of Charles Richards & Sons, Limited, bolt and nut manufacturers, etc., of Darlaston, died on September 15, aged 85. He had been associated with the firm for 69 years. Mr. Richards was a director of Criterion Stampings, Limited, Midland Bolt, Nut & Rivet Company, Limited, and Garratt & Bunch, Limited. He was a founder of the Black and Bright Bolt and Nut Association, being chairman of each for many years and afterwards becoming president.

(*Continued from previous column.*)

Hooton, a director of the company. The company's processes were inspected from the initial input of raw materials to the casting, and the visitors paid special attention to the new No. 2 furnace and the ancillary plant. Mr. J. W. Gardom, president of the Institute, was unavoidably prevented from accompanying the party at the last minute. The visit was recorded by ciné film and tea was taken at the works.

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TENTATIVE RECOMMENDED METHODS FOR CASTING CAST-IRON TEST-BARS

Reply by Sub-committee T.S.4 to the discussion (printed in our last issue) on their report presented at the annual meeting of the Institute of British Foundrymen.

The members of the sub-committee would, in the first place, like to express their thanks to the various contributors to the discussion of their report, and would also like to record their gratification at the wide interest and attention which the report has received. The sub-committee endorses the various remarks made by Dr. Everest as reported in the discussion of the Paper at the annual conference, and in addition would make the following points.

Various speakers emphasised the difficulty of obtaining soundness in B.S.I. bars and some doubts were expressed as to whether the methods put forward would in fact prove effective in obtaining soundness throughout the length of the bar, especially in low-carbon irons. The sub-committee recognise the difficulty in obtaining sound bars in low-carbon irons, and it is on account of the growing use of these irons that this report has become more necessary. Provided suitable precautions are taken and the recommended methods are followed, the sub-committee feel that there should be no difficulty in obtaining sound, clean bars. Mr. Morrogh refers to the use of a shorter bar and points out, quite rightly, that this would solve some of the foundryman's difficulties, but modification of the length of the bar entails revision of the British Standard Specifications, which is, of course, outside the scope of the present committee. This point, however, has been noted and will be submitted to the new technical sub-committee set up to review the working and the possible revision of the current British Standards.

Vertically-cast Bar Favoured

Various speakers referred to the controversy between horizontally- and vertically-cast bars. This was considered in great detail by the sub-committee in its original deliberations, and the overwhelming consensus of opinion was in favour of the vertically-cast bar. This, incidentally, is also in accord with the majority of the foreign specifications where methods of casting the bars are included. Mr. Brown refers to top- and bottom-pouring methods, and the sub-committee agree that it would be desirable if one standard method could be put forward for general use. The sub-committee favour top pouring in all cases where this is practicable, particularly as top-pouring methods induce progressive solidification in the direction necessary to promote soundness. They recognise, however, that some difficulty may be experienced in top pouring long bars in green-sand moulds, and it is to meet these cases that bottom-pouring methods have been included as an alternative.

The sub-committee have taken note of Mr. McRae Smith's criticism of Clause 5 dealing with mould dressings, and they suggest that in any redraft of the recommended methods the first sentence of this clause should be re-worded "Dressings should not be required on oil-sand cores blocks, nor on moulds made in dry sand which contains mineral blacking."

Test-bars in Loam

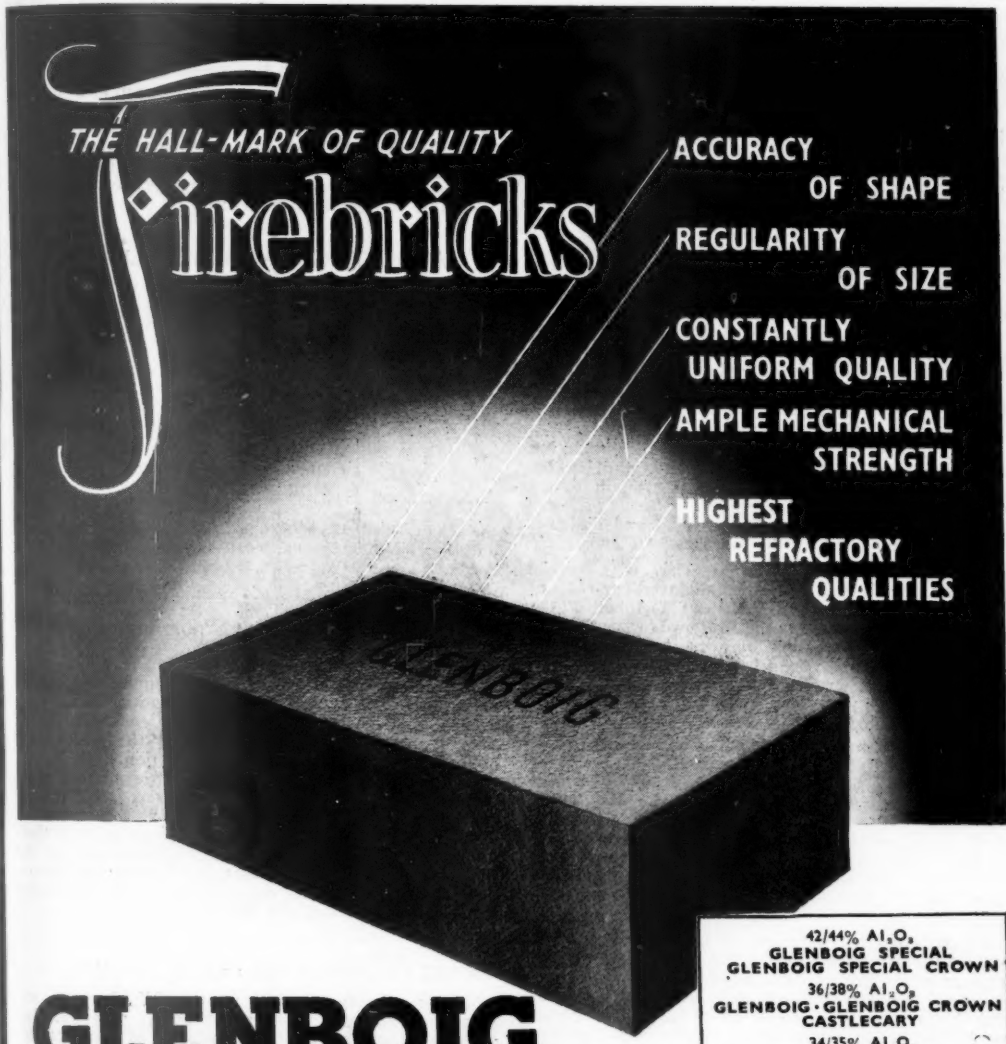
With reference to test-bars in loam, the British Standard Specifications lay it down that test-bars shall be cast in dry sand where loam is used for the parent casting. In this connection it must be realised that the sub-committee is concerned only with separately-cast bars. Referring to strainer cores, the sub-committee would like to emphasise that the object of these cores is to trap dirt and slag and, from the point of view of feeding the bar, provision of heads as laid down in Clause 4 must be made. It is necessary to emphasise, therefore, that the full size of head as indicated must be provided below the strainer core. The point raised by Mr. Hallett concerning the feeding of high alloy iron bars has been noted, but, of course, the present recommendations are intended to cover specifically grey-iron bars to B.S. 321 and 786.

The sub-committee is gratified at the general acceptance of the methods put forward and, in view of the absence of major criticism, it strongly recommends the adoption of these methods by ironfounders. It is felt that it would be premature for the recommendations to be finalised at this stage, and it is suggested that they should be reviewed after a period of use, when perhaps final recommendations could be included in a general specification for cast iron.

FRENCH FOUNDRY DELEGATION

The French Ministry of Industrial Production gave a luncheon last Thursday at Claridge's Hotel to permit members of the French foundry delegation to meet representatives of organised British industry. M. Roger Nathan, of the Ministry, presided.

The guests included:—Mr. J. W. Gardom, president of the Institute of British Foundrymen; M. Dufour, Directeur Général des Etablissements Faure; Mr. T. Makemson, Director of Iron Castings, Ministry of Supply; M. Roger Christa, Comité d'Organisation des Industries de la Fonderie; Mr. A. W. Berry, British Engineers' Association; Mr. H. Scott, Director of Steel Castings, Ministry of Supply; M. Petit, Société des Hauts Fourneaux de Pont à Mousson; Mr. T. Staines, Ministry of Supply; M. Jean Horman, Directeur Général des Acieries de Blanc Misserons; Mr. C. E. Woodruff, Light Metal Association; M. Nicolas Vinçotte, Compagnie Française des Bronzes Phosphoreux, St. Denis; Mr. V. C. Faulkner, Editor of THE FOUNDRY TRADE JOURNAL; Mr. C. G. McAuliffe, Light Alloys Control, Ministry of Aircraft Production; M. Taine, Industries Mecaniques et Electriques; Mr. D. Cherry Paterson, president of the Foundry Trades' Equipment and Supplies Association; M. Perrin, Ministère de la Production Industrielle; Mr. G. T. Skript, Association of Bronze and Brass Founders; Mr. A. J. Murphy, president, London branch, Institute of British Foundrymen; M. J. N. Chapellier, Mission des Industries Mecaniques et Electriques, and Mr. V. Delport, Council of Ironfoundry Associations.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NEWS IN BRIEF

THE BEAUFRE LIMESTONE COMPANY, LIMITED, is being wound up voluntarily. Mr. D. Clifford Hopkins, 28, Charles Street, Cardiff, is the liquidator.

THE UNITED STEEL COMPANIES, LIMITED, announce that acceptances have been received in respect of approximately 90 per cent. of the £1,500,000 4½ per cent. cumulative preference shares recently offered to the stockholders.

REMOVAL OF CONTROLS on nickel and nickel alloys by the Canadian and U.S. Governments is the result of sudden cutbacks in military requirements. There has been substantial curtailment of orders, but it is expected that civilian demand will soon take up some of the slack.

THE GOVERNORS of the North Staffordshire Technical College have gratefully accepted an offer by the North Staffordshire Ironfounders' Association of £1,000 towards the cost of the equipment required in connection with the scheme for the practical training of ironfoundry apprentices.

D. H. DIECASTING COMPANY, LIMITED, of Slough, has been taken over by Mr. W. T. Crowley, who has become managing director, and Mr. A. E. Higginbottom. New plant has been installed, and an expansion scheme to double the present capacity for sand and die casting will be completed by the middle of October.

AN EXTRAORDINARY GENERAL MEETING of Glenfield & Kennedy, Limited, hydraulic engineers and founders, Kilmarnock, will be held on October 12 to sanction an increase in the authorised capital to £1,000,000 by the creation of an additional 250,000 £1 ordinary shares. The proposed capital increase is to implement the acquisition, already announced, of J. Blakeborough & Sons, Limited, and Alley & Maclellan, Limited.

MR. P. L. MARTYN, managing director of the Steel Company of Australia (Pty.), Limited, and a member of the London branch of the Institute of British Foundrymen, started his return trip home last Saturday, after having spent some weeks in this country, where, as a former student of Sheffield University, he has met many of his old friends and colleagues. He desires us to express his gratitude to the many foundry executives who have so kindly shown him round their works.

MR. D. CHERRY PATERSON, M.I.Mech.E., president of the Foundry Trades' Equipment and Supplies Association, was the host to members of the delegation from the French foundry industry at a luncheon held recently at the Waldorf Hotel, London, W.C.2. Short speeches of welcome were given by Mr. Paterson, Mr. J. W. Gardom, president of the Institute of British Foundrymen, Mr. V. C. Faulkner, Editor of THE FOUNDRY TRADE JOURNAL, and Mr. W. Rawlison, vice-president of the association. M. Roger Christa, commissaire provisoire du Comité d'Organisation des Industries de la Fonderie, head of the delegation, replied.

Mr. E. H. Lever, chairman of Richard Thomas & Baldwins, Limited, in a statement to the shareholders which accompanies the report and accounts, declares that all the statements made and the hopes held out in the circular recommending the merger have already been completely justified. Plans are well advanced for the erection of a large continuous hot strip mill at Margam, near Port Talbot, under the ægis of Guest Keen Baldwins Iron & Steel Company, Limited. It is expected that this new mill will be capable of producing approximately 18,000 tons of hot strip and other products per week, of which a large proportion will be available to the tinplate industry.

AUGUST IRON AND STEEL OUTPUT

The figures below show pig-iron and steel-ingot production for August, 1945. Production was materially affected by holidays, including VJ-Day.

	Pig-iron		Steel ingots and castings	
	Weekly average	Annual rate	Weekly average	Annual rate
First half, 1945	133,900	6,963,000	231,600	12,043,000
July	134,800	7,010,000	213,800	11,118,000
August	125,200	6,512,000	186,100	9,676,000

STEEL FEDERATION'S INDEPENDENT CHAIRMAN

The British Iron and Steel Federation announce that the Rt. Hon. Sir Andrew Rae Duncan, M.P., has accepted an invitation to become independent chairman of the Executive Committee of the Federation under the terms of their new constitution.

Sir Andrew Duncan occupied a corresponding post with the Federation from 1935 to 1940. He left in January, 1940, to become President of the Board of Trade, and served in the Cabinet continuously in that office or as Minister of Supply until the resignation of Mr. Churchill's Cabinet. Before going to the Federation in 1935 Sir Andrew was for eight years chairman of the Central Electricity Board.

SALVAGING MAGNESIUM CASTINGS

Salvage of magnesium castings rapidly becomes an economic necessity for a foundry, says B. L. AVERBACH, writing on "Reclamation of Magnesium Castings by Helium Arc Welding," in "Metal Progress," June, 1945. The helium arc process, he says, is capable of salvaging a large number of these castings, but he states that for walls ¼ in. and under a preheating temperature of 300 deg. F. should be used; for walls ¼ in. and over a temperature of 600 to 700 deg. F. should be employed, with 640 deg. recommended for safety.

NO. 10 PREPARED BLACKING

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Raw Material Markets

IRON AND STEEL

Foundries in the jobbing section are dealing with numerous inquiries for castings, but they are still unable to increase output capacity, largely in consequence of the tight labour position.

The light foundries are busy to the limit of their present supply of man-power. Here the tendency is definitely towards expansion, if only the necessary skilled and unskilled labour can be obtained. Textile machinists are making some headway in tackling the problems of the change-over, and there has been some increase in the demand for pig-iron from this direction, applications for buying licences being treated a trifle more generously.

From nearly all users, the pressure for deliveries of common irons is fully maintained. The provision of bulk supplies of high-phosphorus iron for the light foundries is left largely in the hands of Midlands producers, and, although they are working on narrow margins, current needs are being covered. Supplies of other grades of iron are more plentiful, due to the fact that the engineering foundries have not yet been able to change over completely to peacetime manufactures. As a rule, users have no difficulty in obtaining licensed deliveries of low- and medium-phosphorus, refined and hematite irons. Production has been stimulated by the freer import of Swedish and North African ores, although tonnages coming to hand are still far below peacetime levels.

The recent impetus in the demand for light sections, bars and strip calls for much bigger supplies of billets, blooms, etc., than are at present available. Re-rollers are using all sorts of material, such as crops, defectives, etc., but there is still a gap which can only be bridged by bigger imports or increased home production. How the latter is to be accomplished is by no means clear, as the call for sheet bars gathers intensity and there appears to be no sense in robbing Peter to pay Paul.

In the heavy steel trade, there are developing signs of recovery. Export orders have provided a welcome supplement to a still limited home demand, but some of the mills, chiefly those engaged on heavy joists and sections, are still in a position to handle more overseas trade than has yet filtered through the maze of official restrictions.

The activity of the sheet trade is quite unabated. Rail mills have a big accumulation of orders and the colliery quotas of arches, props and roofing bars will impose heavy demands on the mills during the last quarter of the year.

NON-FERROUS METALS

Copper consumption in the United States is decreasing. This fact is emphasised by the figures published by the American Copper Institute for August. Admittedly, these statistics show only a slight downward trend, but they must be taken as the forerunner of more pronounced decreases in future months. This is the inevitable result of the transition period. It is to be hoped, however, that the return to a consistent high rate of consumption will not long be delayed.

It is reported from Malaya that some 1,200 tons of tin, accumulated by the Japanese, is ready for immediate export. A few tin dredgers are in serviceable condition, but not many. Prospects of a speedy resumption in production are lessened by the labour shortage, general throughout the peninsula.

The slackening demand for scrap is puzzling merchants, who are at a loss to account for it. Prices, meanwhile, remain unchanged.

PERSONAL

MR. HERBERT LESLIE WYNEKEN has been appointed secretary and chief accountant of Edgar Allen & Company, Limited.

LORD WOOLTON has been elected a director of the Birmingham Small Arms Company, Limited, and of the Birmingham Railway Carriage & Wagon Company, Limited.

MR. J. W. JESSOP has been appointed a director of William Jacks & Company, Limited. He will continue to act as chief manager in India. MR. W. P. NAIRN, secretary of the company, has been appointed a director and will continue to act as secretary.

MR. R. A. HOWARD has been appointed technical manager for the Birmingham and Midland district of E. Hind (South Bank), Limited, South Bank-on-Tees, Yorkshire. He will operate from the company's Birmingham office at County Chambers, Martineau Street.

MR. A. R. WILLIAMSON, director and secretary of the Crane Foundry Company, Limited, Wolverhampton, who had been connected with the firm for nearly 55 years, retired recently. MR. J. A. RICHARDS, general manager, has now been appointed managing director. The whole of the issued capital of the company was recently purchased by Qualcast, Limited.

Wills

HAMER, R. J., of Sheffield, engineer	£2,358
ALLAN, ROBERT, of Glasgow, iron and steel merchant...	£22,135
BELL, COL. SIR M. H. L., a director of Dorman, Long & Company, Limited, and of Horden Collieries, Limited	£206,838

Alex. Findlay & Co. Ltd.
Structural Engineers, Motherwell, Scotland
Head Office: MOTHERWELL, N.B. London Office: 52/4, HIGH HOLBORN, W.C.1
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